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SUPERSEDING
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(See 6.5)

MILITARY SPECIFICATION

PLASTIC MATERIAL, UNICELLULAR (SHEETS AND TUBES)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers chemically expanded unicellular elastomeric plastic foam material for thermal insulation.

1.2 Classification. Plastic foam shall be of the following forms, as specified (see 6.2):

Form T - Tubular.
Form S - Sheet.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATIONS

FEDERAL
PPP-B-576 - Box, Wood, Cleated, Veneer, Paper Overlaid.
PPP-B-591 - Boxes, Fiberboard, Wood-Cleated.
PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636 - Box, Shipping, Fiberboard.
PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple-Wall.
PPP-B-655 - Boxes, Fiberboard, Six or Eight Sides.

MILITARY
MIL-P-116 - Preservation-Packaging, Methods of.
MIL-A-24179 - Adhesive, Flexible Unicellular-Plastic Thermal Insulation.

STANDARDS

FEDERAL
FED-STD-601 - Rubber: Sampling and Testing.

MILITARY
MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-414 - Sampling Procedures and Tables for Inspection by Variable for Percent Defective.
MIL-STD-1623 - Fire Performance Requirements And Approved Specifications For Interior Finish Materials And Furnishings (Naval Shipboard Use).

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

C 177-63 - Thermal Conductivity of Materials by Means of the Guarded Hot Plate, Test for.
C 355-64 - Water Vapor Transmission of Thick Materials, Test for.
C 518-70 - Thermal Conductivity of Materials by Means of the Heat Flow Meter, Test for.
D 471-72 - Change in Properties of Elastomeric Vulcanizates Resulting From Immersion in Liquids, Test for.
D 1667-70 - Sponge Made from Closed Cell Poly (Vinyl Chloride) or Copolymers Thereof, Specification and Tests for.
D 2326-70 - Thermal Conductivity of Cellular Plastics by Means of a Probe, Test for.
E 162-67 - Surface Flammability of Materials Using a Radiant Heat Energy Source, Test for.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Qualification. The plastic foam material furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 Material. The material shall be a flexible foam composed of a multitude of individual closed cells of uniform size, free of extraneous and degrading matter, and of seams.

3.3 Form, dimension, and tolerance. The dimensions and form of plastic foam material shall be as specified (see 6.2). Unless otherwise specified (see 6.2), tolerances shall be as specified in table I.

Table I - Dimensional tolerances of sheets and tubing.

Nominal thickness (Inches)		Length and width (Inches)		Inside diameter (Inches)	
Dimension	Tolerance	Dimension	Tolerance	Dimension	Tolerance
Sheets					
Up to 1/4, inclusive	+3/32 -1/32	Up to 6, inclusive	±1/4 inch	----	----
Over 1/4 to 1/2	+3/32 -1/32	Over 6 to 12, inclusive	±3/8 inch	----	----
Over 1/2 to 1	±3/32	Over 12	±3 percent	----	----
Over 1	±1/8				
Tubular form					
Up to 3/4, inclusive	-0 to +1/8			Up to 1/2, inclusive	-0 to +3/32
3/4 and over	-0 to +3/16	as specified (see 6.2)	-1 to +4	Over 1/2 to 1, inclusive	-0 to +1/8
				Over 1 to 1-1/2, inclusive	-0 to +3/16
				Over 1-1/2 to 2-3/8, inclusive	-0 to +1/4
				Over 2-3/8	-0 to +3/8

3.4 Finish. Unless otherwise specified (see 6.2), sheets and tubes shall have at least one surface skin. The surface shall mean a major surface, and shall not include the edges or ends. The material, when furnished, shall not contain tears and shall not have been repaired.

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3.5 Color. If furnished in color other than black (see 6.2), each color shall be qualified separately.

3.6 Physical requirements. The material shall conform to the additional requirements shown in table II when tested as specified in 4.6.

Table II - Physical requirements.

Property	Test reference	Forms T and S
Density, pounds per cubic foot	4.6.4	4.5 to 8.5
Compression resistance at 25 percent deflection, (psi)	4.6.5	2.0 to 6.0
Water absorption (psf) maximum	4.6.6	0.1
Compression set, percent, maximum	4.6.7	24
Dimensional change, length percent maximum	4.6.8	7
Fire resistance, flame spread maximum[1/]	4.6.9.1	Not applicable
Smoke density maximum	4.6.9.2	Not applicable
Flaming		
Non-flaming		
Oil resistance	4.6.10	No softening or visible swelling
Tensile strength psi, minimum	4.6.12	40
Ultimate elongation, percent minimum	4.6.12	100
Tensile strength of cemented joints[2/]		
before aging, minimum	4.6.13.1	No bond failure
after aging, minimum (Form T only)	4.6.13.2	No bond failure
Flexibility at 28°F (-2.22°C) (initially)	4.6.14.1	No cracking
After heat aging for 7 days at 180°F (82.22°C) (Form T only)	4.6.14.2	No cracking
Thermal conductivity BTU/hr sq ft (°F/in) at mean temp. 75°F (23.89°C) K factor, maximum	4.6.15	0.30
Water vapor permeability perm-in (maximum)	4.6.16	0.30

[1/] The material shall not melt, drip, or flow when tested as required.

[2/] This requirement is only to determine if the material can be bonded to itself when slit for shipboard application. The material as supplied shall have no seam or joints.

3.7 Odor. The material shall be free from objectionable odor when tested as specified in 4.6.11.

3.8 Adhesive cement. When specified (see 6.2), the insulation manufacturer shall recommend an adhesive which shall be suitable for permanently securing the plastic foam material to itself and to applied structures under the stated conditions. For use on submarines, the recommended adhesive shall conform to the type (see 6.2), specified under MIL-A-24179. Unless otherwise specified (see 6.2), for applications other than on submarines, the recommended adhesive shall be a high-flash point, (greater than 100° Fahrenheit (F)) quick drying contact type. For any application, all recommended cements shall pass the tests specified in 4.6.13 for form T material. Recommended adhesive shall not adversely affect, initially or in service, the plastic foam materials (see 3.2, 3.3, 3.4, and 3.6), or the surfaces on which it may be applied.

3.8.1 Instruction sheet for adhesive cement. When specified (see 6.2), the manufacturer of the plastic foam material shall also provide instruction sheets for adhesive cement recommended (see 3.8). The instruction sheet shall contain the following information:

(a) Names and addresses of adhesive manufacturers.
(b) Adhesive manufacturer's commercial designation and code number.
(c) Installation instructions including application to a substrate when specified and described (see 6.2).
(d) Handling precautions (if any).

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3.9 Protective covering or coating. If the purchasing activity specifies conditions of exposure (severe abrasion, puncture, outdoor weathering, ozone or ultra violet radiation, and others) (see 6.2), the plastic foam supplier shall furnish recommendations for an appropriate protective covering and methods of application. The instruction sheet shall contain the same type of information as required in 3.8.1. The material shall meet the fire resistance requirements of table II.

3.10 Cores (form T only). Unless otherwise specified (see 6.2), tubular form material having an inside diameter of 2-1/8 inch or greater shall be provided with paper or fiberboard cores of sufficient strength and adequate in size to prevent distortion of the tubing under normal conditions of transportation and handling. The requirement for paper or fiberboard cores for form T material having an inside diameter of less than 2-1/8 inches may be waived by the procuring activity, if specified (see 6.2).

3.11 Marking. Tubes shall be imprinted with size information to include the Iron Pipe Size (IPS) accommodated, if applicable, the wall thickness, and inside diameter.

3.12 Toxicity. The material shall have no objectionable odor (see 3.7), and shall not contain any benzene or carbon tetrachloride in its manufacturing process (see 4.6.17).

3.13 Elastic memory (form T only). The tubing shall not fall off of any portion of the pipe section after a test time of one hour (see 4.6.18).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) Qualification inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 Qualification tests.[1/] Qualification tests shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center. Qualification tests shall consist of the examinations of 4.5 and the tests specified in 4.6.

4.3.1 Periodic control tests. Periodic control tests shall be the tests of 4.6.9. These tests shall be conducted under the supervision of the Government inspector at a laboratory satisfactory to the Naval Ship Engineering Center (NAVSEC) at six month intervals.

4.3.1.1 A certificate shall be supplied by the manufacturer to the procuring activity and NAVSEC specifying the results of the test and that the formulation previously submitted to NAVSEC (see 4.6.17) has not been changed or modified. If the formulation is changed in the period between tests, the materials shall be retested and another certificate shall be submitted. The fire resistance certificate shall be supplied by the primary material manufacturer for each order, contract or release of any individual order or contract.

4.3.2 If product is ordered with a protective covering (see 3.9), the product shall conform to the fire resistance (flame spread and smoke density) requirements of MIL-STD-1623.

[1/] Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3 and 6.3.1).

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4.4 Quality conformance inspection.

4.4.1 Lot. For purposes of sampling an inspection lot for examination shall consist of all material of the same form and thickness, produced in one plant under essentially the same conditions and offered for delivery at one time. The unit of product shall consist of one sheet of form S or of one 5 or 6 foot length of form T tubing as applicable.

4.4.1.1 Sampling for inspection. Sampling for inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated.

4.4.1.2 Sampling for quality conformance tests. A random sample of material shall be selected from each lot in accordance with Inspection Level II of MIL-STD-414. A lot for quality conformance tests shall be as described in 4.4.1 except that tubes of more than one inside diameter may be grouped together for the required tests.

4.4.2 Quality conformance tests. Samples selected in accordance with 4.4.1.2 shall be subjected to the tests of table III. If the samples are of such size or shape that test specimens cannot be prepared from them, a substitute sample shall be provided in the form of a piece or pieces of plastic foam having dimensions appropriate for the tests required. The substitute samples shall be certified to be of the same material and to be representative of the lot of finished items offered for delivery. The AQL shall be 2.5 percent for each of these tests. Computations shall be accomplished as shown in section B of MIL-STD-414. However, if the result of any test can only be expressed as pass or fail, sampling shall be in accordance with Inspection Level I of MIL-STD-105 with an AQL of 2.5 percent.

Table III - Quality conformance tests.

Tests	Paragraph
Density	4.6.4
Compression resistance	4.6.5
Water absorption	4.6.6
Compression set	4.6.7
Dimensional change	4.6.8
Tensile strength	4.6.12
Ultimate elongation	4.6.12

4.5 Examination. An examination shall be made in accordance with the classification of defects, inspection levels, and acceptable quality levels (AQL) as specified herein. The lot size, for the purpose of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of sheets or tubes, as specified, for examination in 4.5.1, 4.5.2, and in units of shipping containers for examination in 4.5.3.

4.5.1 Examination for defects in appearance and workmanship. The sample unit for this examination shall be one sheet or tube, as applicable. The sample unit shall be examined for defects shown in table IV.

Table IV - Classification of defects.

Category	Item	Defect
Critical	Sheets and tubular form	Appearance
01		Any cut, tear, seam, or repaired section.
02		Surface skin missing or not as specified.
Major		
101		Presence of dirt, foreign material, embedded particles, large voids.
Minor		Workmanship
201		Cell size not uniform.
202		Color not uniform throughout material.

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4.5.2 Examination for dimensional defects. The sample unit for this examination shall be one sheet or tube, as applicable. The sample unit shall be examined for defects shown in table V.

\# Table V - Classification of defects.

Category	Item	Defect
Critical		None defined.
Major		
101	Sheets and tubular form	Length and width varies by more than the applicable tolerance specified in table I.
102		Thickness varies by more than the applicable tolerance specified in table I.
103	Tubular form only	Inside diameter varies by more than the applicable tolerance specified in table I.
Minor		None defined.

4.5.3 Examination of preparation for delivery. An examination shall be made to determine that packaging, packing, and markings comply with the requirements of section 5 of this specification. The sample unit for this examination shall be one shipping container, fully packed, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects as shown in table VI.

Table VI - Classification of defects.

Category	Item	Defect
Critical		None defined.
Major		
101	Packaging	Unit container not packaged as specified.
102		Packaging material not as specified.
103		Paper or fiberboard cores missing from tubing, unless otherwise specified.
104		Interleaving of sheets omitted not as specified.
105	Packing	Not in accordance with contract requirements. Not level specified.
106		Container not as specified, closure not accomplished by specified methods or materials.
107		Inadequate application of components.
108	Instruction sheets	Instruction sheet for adhesive cement missing or not as specified (see 3.8).
109		Instruction sheet for protective covering or coating missing or not as specified, when required.
110	Count	Less than specified or indicated quantity.
111	Weight	Gross weight exceeds contract requirements.
112	Markings	Interior or exterior markings (as applicable) omitted, illegible, incorrect, or not in accordance with contract requirements.
Minor		None defined.

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4.5.4 Inspection levels and acceptable quality levels for examination. The inspection levels for determining the sample size and the AQL expressed in defects per 100 units, shall be as follows:

Examination paragraph	Inspection level	AQL
4.5.1	I	2.5
4.5.2	I	2.5
4.5.3	I	2.5

4.6 Method of tests.

4.6.1 Conditioning procedures. Unless otherwise specified, all tests shall be conducted at a temperature of 73.5° ± 2°F and 50 ± 4 percent relative humidity (RH) on specimens conditioned for at least 5 hours in the same atmosphere prior to testing. Specimens shall be conditioned at an atmosphere of 73.5° ± 2°F, and 50 ± 2 percent relative humidity for at least 24 hours and tested at the same atmospheric conditions.

4.6.2 Dimensional measurements of test specimen.

4.6.2.1 Results. Results reported shall be the average of a minimum of three measurements.

4.6.2.2 Tubular form. Unless otherwise specified, the length shall be measured with any suitable measuring device graduated in 1/16 inch. Care shall be taken not to distort the flexible unicellular material. Thickness and inside diameter measurements shall be measured with any suitable measuring device graduated in 1/32 inch. Three thickness measurements shall be taken, distributed around the circumference.

4.6.2.3 Sheet. Unless otherwise specified, the length and width shall be measured with a suitable measuring device graduated in 1/16 inch. Care shall be taken not to distort the flexible unicellular material. Thickness shall be determined in accordance with method 12031 of FED-STD-601. Three measurements equally spaced over the specimen shall be made.

4.6.3 Weight measurement. Unless otherwise specified, all test specimens shall be weighed to the nearest 0.1 gram.

4.6.4 Density. The density of the material shall be determined by the procedure specified in ASTM D 1667-70.

4.6.5 Compression resistance. Compression resistance shall be determined in accordance with method 12151 of FED-STD-601, except that the deflection shall be maintained at 25 percent with automatic or manual control, and the load observed and recorded 60 seconds after the 25 percent deflection is reached.

4.6.6 Water absorption.

4.6.6.1 Specimens. Test specimens shall be 4 by 4 inches square or semicylindrical sections (tubular form cut in half longitudinally) 6 inches long in the thickness furnished. The specimen may have the natural skin on top and bottom, outer and inner surfaces, or on only one or none of these surfaces, as specified in 6.2.

4.6.6.2 Procedure. Specimens shall be submerged in distilled water at room temperature (65° to 95°F)(18.33° to 35°C) 2 inches below the surface of the water and subjected to a vacuum of 25 inches of mercury for 3 minutes. Release the vacuum and allow the specimen to remain submerged for 3 minutes at atmospheric pressure. Remove the specimen, allow to stand on end to drain for 10 minutes and blot lightly with paper towels. Values of each of the three specimens shall be calculated and reported in terms of pounds of water gain per square foot of skinless surface.

4.6.7 Compression set.

4.6.7.1 Specimens. The specimens shall have parallel top and bottom surfaces which shall be at right angles to the side surfaces. The specimen may be cylindrical or rectangular. The minimum dimension across the top shall be at least equal to the thickness. The top shall be not less than one square inch in area.

4.6.7.2 Procedure. The compression set of the material shall be determined in accordance with ASTM D 1667-70 except that the maximum dimension across the top of the specimen shall not be more than 16 square inches in area.

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4.6.8 Dimensional change.

4.6.8.1 Specimens. Test specimens shall consist of pieces 12 inches by 3 inches by the thickness of the sheet supplied or tubular sections 12 inches long by the thickness furnished.

4.6.8.2 Procedure. Bench marks, approximately 10 inches apart, shall be placed on the center line of the specimens about one inch from the ends and the distance measured to the nearest 0.01 inch. The specimens shall be placed lengthwise on a piece of wooden board in an oven equipped with air circulation at 200° ± 3°F for seven days. The specimen shall be removed from the oven, conditioned for a minimum of 2 hours at 70° ± 5°F and the distance between the bench marks measured. The dimensional change shall be expressed in percent of the original length.

4.6.9 Fire resistance.

4.6.9.1 The Flame Spread Index shall meet the requirements of MIL-STD-1623.

4.6.9.2 Smoke density. The smoke density shall meet the requirements of MIL-STD-1623.

4.6.10 Oil resistance.

4.6.10.1 Specimens. The test specimens shall be not less than 1 inch by 1 inch by the thickness of the material.

4.6.10.2 Procedure. The specimen shall be immersed in ASTM No. 3 oil of ASTM D 471-72 for 70 hours. The specimen shall then be removed, blotted with filter paper, and compared to an untreated specimen of similar size for apparent softness and visible swelling.

4.6.11 Odor. The odor of sheets and tubular forms at room temperature shall be determined by sniffing. The odor of form T specimens that are being subjected to the aging test (180°F - 7 days) specified in 4.6.13.2, shall be determined at the end of the first and seventh day by sniffing.

4.6.12 Tensile strength and ultimate elongation.

4.6.12.1 Specimens. The test specimens shall be 1/4 ± 1/32 inch thick by 1/2 ± 1/16 inch wide. Die I of method 4111 of FED-STD-601 shall be used. The specimens shall have the number of skins as specified (see 6.2).

4.6.12.2 Procedure. The tensile strength and ultimate elongation shall be determined by methods 4111 and 4121, respectively, of FED-STD-601, with the following exceptions:

(a) A 0.5 ounce weight shall be used on the presser foot for measurement of thickness.
(b) The number of test specimens and test values shall conform to the requirements of MIL-STD-414.
(c) All values shall be reported.
(d) Median values shall not apply.

4.6.13 Strength of cemented joints.

4.6.13.1 Before aging. Test specimens conforming to 4.6.12.1 shall be cut in half at the center of the constricted portion and cemented together in accordance with manufacturer's recommendations (see 3.8.1). Allow to air dry for at least 24 hours. The strength of the cemented joint shall be determined as specified in 4.6.12. The number of specimens shall be that given in 4.6.12.2. The values reported shall be stated as either pass or fail.

4.6.13.2 After aging (form T only). Specimens, prepared as in 4.6.12.1, shall be aged at 180° ± 2°F for 7 days. The strength of the cemented joints shall be determined as specified in 4.6.12 except the specimen shall be removed from the oven and permitted to rest at ASTM standard test conditions for not less than 16 hours or more than 70 hours before being subjected to the tests. The number of specimens shall be that given in 4.6.12.2. The values reported shall be stated as either pass or fail.

4.6.14 Flexibility at 28°F.

4.6.14.1 Initial. Test specimens shall have skin on one side, both sides, or no skin, as specified in 6.2. The size of the specimen shall be approximately 1 inch by 8 inches with a thickness of 1/4 ± 1/16 inch. The test specimens and equipment shall be conditioned

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for at least 4 hours at 28° ± 2°F and bent 180 degrees around a 1/2 inch diameter steel mandrel within 5 seconds at the test temperature. Care shall be taken to avoid warming the test specimens, particularly at or near the bend point, in performing the test.

4.6.14.2 After heat aging (form T only). Two sets of specimens shall be prepared as specified in 4.6.14.1. One set shall be cut in half and cemented together as specified in 4.6.13.1. Both sets of specimens shall be aged for 7 days as specified in 4.6.13.2 and conditioned as specified in 4.6.14.1. Bend the specimens 180 degrees around a 1/2 inch diameter steel mandrel, except that for the cut specimens, the 180 degree bend shall be at the cut seam.

4.6.15 Thermal conductivity. The thermal conductivity (k factor) shall be determined at a mean temperature of 75°F (23.89°C) on flat sections of material according to the method specified in ASTM C 177-63, C 518-70, or D 2326-70. The material must first be certified using the test method specified in ASTM C 177-63. Subsequent production and quality conformance check tests may involve use of ASTM C 518-70 or D 2326-70. In the event of a dispute, ASTM C 177-63 shall be the referee test method. Report individual test values. Average values shall not apply.

4.6.16 Water vapor permeability.

4.6.16.1 Method. The water vapor permeability tests shall be performed according to the method specified in ASTM C 355-64 with the exceptions noted below. Only the water method shall be performed.

4.6.16.2 Specimen. Specimens shall be of 1/2 inch nominal thickness, or the thickness of the sheet, as specified in 6.2, if less than 1/2 inch. The specimen shall have skin on one side, or shall be skinless as specified in 6.2. Specimens from sheet equivalent material shall have skin on both sides.

4.6.16.3 Conditioning. The specimens shall be conditioned for a minimum of 46 hours at 73.4° ± 1.8°F and 50 ± 4 percent relative humidity. The test shall be conducted in this atmosphere.

4.6.16.4 Dimensions. The thickness of the specimen shall be measured as specified in 4.6.2.3. The area of the unsealed surface shall be determined to within plus or minus 1 percent.

4.6.16.5 Attachment of specimen. The specimen shall be attached to the test dish so that the skin is towards the high humidity, if skin is not excluded (see 6.2).

4.6.16.6 Calculations. The permeability is expressed in PERM-IN. All test values shall be reported except test averages, which shall not apply.

4.6.17 Toxicity. A manufacturer of material shall disclose the formulation of his product to the Naval Ship Engineering Center, Materials Development and Applications Office, Center Bldg., Prince George's Center, Hyattsville, Maryland 20782, or to an activity acceptable to the Naval Ship Engineering Center, in detail sufficient to permit an accurate appraisal of the likelihood of generation of nauseous, irritating, or toxic gases or aerosols to any temperature up to 100°C (212°F).

4.6.18 Slit tube test for elastic memory. A six foot length of the form T material shall be selected at random. The tubing shall be slit lengthwise and in a straight line with a razor knife. The slit tubing shall then be opened and placed over a horizontally suspended pipe having an outside diameter equal to the initial inside diameter (before slitting) of the tubing. The slit shall be placed in the 12 O'clock (top) position. After one hour the test specimen shall be examined and the position of the tubing shall be determined. Tubing which has fallen off of the pipe completely or any section thereof shall be considered having failed this test.

4.7 Inspection of preparation for delivery. The packaging, packing, and marking shall be inspected to determine compliance with the requirements of Section 5 of this specification.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.4).

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5.1 Packaging. Packaging shall be Level A or C, as specified (see 6.2).

5.1.1 Level A. Plastic foam, sheet, and tubular form, shall be packaged in accordance with MIL-P-116, method III, as specified herein.

5.1.1.1 Sheet. Sheets shall be packaged flat and interleaved with paper or other suitable material to prevent adhesion of sheets during shipment and storage.

5.1.1.2 Tubes. Tubes shall be furnished in straight lengths or in coil form, except when cores are provided (see 3.10). The inside of all tubing shall be uniformly powdered with talc or mica powder for ease of application. Unless otherwise specified (see 6.2), powdering is not required on slit tubing. Straight lengths and coil form shall be packaged in fiberboard boxes conforming to PPP-B-636. Boxes containing coil form shall be provided with fiberboard inserts in accordance with the suppliers practice. Box closure shall be in accordance with the appendix to the box specification.

5.1.2 Level C. Packaging shall be sufficient to afford adequate protection against deterioration and physical damage during shipment from the supply source to the first receiving activity for immediate use, or for controlled humidity storage. This level may conform to the suppliers commercial practice when such meets the requirements of this level.

5.2 Packing. Packing shall be Level A, B, or C, as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 Sheets. Sheets, packaged as specified (see 6.2), shall be packed in snug containers conforming to any one of the following specifications at the option of the supplier:

Specification	Type or class
PPP-B-576	Class 2
PPP-B-591	Weather resistant
PPP-B-601	Overseas type
PPP-B-621	Class 2
PPP-B-636	Class weather resistant
PPP-B-640	Class 2

All corners and edge seams and manufacturer's joints of fiberboard boxes shall be sealed with tape in accordance with the appendix to the applicable fiberboard box specification. Box closure, strapping or banding shall be in accordance with the applicable box specification or appendix thereto. The gross weight of wood or wood-cleated boxes shall not exceed 200 pounds; fiberboard boxes shall not exceed the weight limitations of the applicable fiberboard box specifications.

5.2.1.2 Tubular form. Tubes, packaged as specified (see 6.2), shall be packed as specified in 5.2.1.1. When specified (see 6.2), unit fiberboard boxes (see 5.1.1.2) conforming to class weather resistant of PPP-B-636, closed, sealed, and reinforced as specified in 5.2.1.1 above, may be used as shipping containers.

5.2.2 Level B.

5.2.2.1 Sheets. Sheets, packaged as specified (see 6.2), shall be packed as specified in 5.2.1.1, except containers shall be class 1 or domestic type.

5.2.2.2 Tubes. Unless otherwise specified (see 6.2), tubes packaged as specified (see 6.2), shall require no further packing. In lieu of packaging coils in fiberboard boxes with inserts as specified in 5.1.1.2, fiberboard boxes may conform to PPP-B-655, type I or II at the option of the supplier.

5.2.3 Level C. Plastic foam packaged as specified in 5.1.2, shall be packed to insure acceptance by common carrier at the lowest rate and will afford protection against physical and mechanical damage during direct shipment from the supply source to the first receiving activity for immediate use. The method of packing shall comply to the Uniform Freight Classification Rules or other carrier regulations as applicable to the mode of transportation and may be the supplier's commerical practice when such meets the requirements of this level. The inside of tubes shall be uniformly powdered with talc or mica powder for ease of application.

5.3 Marking. In addition to any special marking required (see 6.2), interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.

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6. NOTES

6.1 Intended use. The materials covered by this specification are intended for thermal insulation only. It may be used in either sheet or tubular form. In tubular form, the insulating material is intended for piping systems operating at temperatures from minus 20° to 180°F. This material has low thermal conductivity, is a good vapor barrier, and is serviceable at operating temperatures. Material covered by this specification may vary in thermal conductivity depending upon the manufacturer. The minimum wall thickness to prevent condensation will therefore vary (see table I and 6.2).

6.2 Ordering data.

6.2.1 Procurement requirements. Procurement documents should specify the following:

~~(a) Title, number, and date of this specification.~~
(b) Form required (see 1.2 and 3.3).
(c) Dimensions as required and tolerance, if different (see 3.3).
(d) Location of skin or whether skin is unacceptable (see 3.4 and 4.6.16.5).
(e) Whether color is other than black (see 3.5).
(f) Adhesive required (see 3.8 and 3.8.1).
(g) Number of sheets, or lengths of tubing, and quantity of adhesive required.
(h) Whether data for a protective covering or other coating is required (see 3.9).
(i) Core, if different (see 3.10).
(j) Number of skins required (see 4.6.12.1).
(k) Level of packaging and level of packing required (see 5.1 and 5.2).
(l) When unit packages need not be overpacked (see 5.2.1.2).
(m) Whether unit packages required additional packing (see 5.2.2.2).
(n) Special marking required including placing lot/batch number of sheets and tubes, and on the packing case (see 5.3).

6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL 15280 whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Prince George's Center, Center Building, Hyattsville, Maryland 20782, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.5 THE MARGINS OF THIS SPECIFICATION ARE MARKED "#" TO INDICATE WHERE CHANGES (ADDITIONS, MODIFICATIONS, CORRECTIONS, DELETIONS) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS WAS DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

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